depend upon the use of the plumb-line or spirit-level. Hadley's reflecting quadrant or sextant, or the circle made upon his principles, are therefore the only instruments adapted for nautical purposes, and they are of the greatest importance, from their enabling the observer to see two objects at the same time, while they do not require that steadiness which is essential to the accuracy of observations made by fixed instruments. The operation of Hadley's quadrant depends upon that principle in optics which says, that when a ray of light is reflected from a flat polished surface, the angle of incidence is always equal to the angle of reflection; thus, if a ray of light fall upon a looking-glass at an angle of 45 degrees, it will also be reflected at an angle of 45 degrees, and so of any other angle; and if the incident ray fall vertically, or at an angle of 90 degrees, with the glass, it will be reflected perpendicularly, or will return in precisely the same line; it must also be remembered that objects are always seen in the direction in which the rays of light proceeding from them reach the eye. Thus a person looking at his image in a mirror, sees it just as far behind the glass as he is before it, because he sees the image in the direction in which the rays of light are reflected from the surface of the glass to his eye. As upon this principle observations are made with Hadley's quadrant, which is furnished with two small mirrors, one of which is only silvered in part, so that in taking the angle subtended by two objects, while the first object is reflected to the eye by the glasses, the second is seen by direct vision through that part of the glass that is not silvered; the quadrant is accordingly adjusted, the two objects exactly coincide, and the angle is then read off upon the graduated arc to which a vernier is attached. This instrument neither requires the use of the plumb-line or spirit-level, the former of which is better adapted to larger and the latter to smaller instruments, as the spirit-level used on all instruments consists of a glass tube hermetically sealed at both ends and nearly filled with water, spirits of wine, or ether, and the small bubble of air contained in the tube, always occupies the highest part; and when the instrument is of such a description as that its horizontal plate can be worked by screws for that purpose, the true horizontal level may be readily obtained by adjusting the horizontal plate till the air bubble is exactly in the centre of the tube in which it is placed, to ascertain which the glass tube should be divided into parts, at a distance from each end of the tube, so as that the smallest error might be discernible; but the quadrant requires no assistance of this kind; it may appear that the vertical angles cannot be taken by it; at sea, however, the natural boundary of the horizon is as perfect a means of taking vertical angles as can be supplied by any instrument; and it is only when the weather is hazy or when observations are made on land, that any difficulty arises in this respect, and in such cases resort is had to what is termed an artificial horizon, which is produced in various ways, but most commonly by reflection from the surface. If quicksilver be poured into a vessel it forms an excellent mirror, and in order to take the vertical angle of any elevated object, a star, for instance, it is necessary to adjust the quadrant till the star and its image in the mirror exactly coincide; the angle is then read off. But it must be observed that this will not be the actual horizontal angle, for as the image of the object is exactly as far below the horizon as the object is itself above it, the angle indicated by the instrument must be bisected or divided into two equal parts, and by taking half the angle, we know we are furnished with the actual vertical angle subtended by the star with the horizon as correctly as though the latter had been visible. But, Sir, I had thought to have continued this letter, and explained the application of trigonometry to various useful purposes; but my time for the present will not allow me, and I will, therefore, defer it till a future number of your paper.

I am, Sir, your very obedient servant,

JAMES WILLIAMS COLY,
C.E. and Land-surveyor.

Bridgend, April 11, 1843.

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CITY OF LONDON SURVEYORSHIP.—The death of Mr. Montague has caused a vacancy in this highly important and lucrative office. Mr. Tite is said to be likely to succeed to the city district, and Mr. John Stevens, son of Mr. Deputy Stevens, to the western district; but there are several candidates in the field.

The Queen Dowager has been graciously pleased to transmit the sum of 20*l.* in aid of the funds for erecting a new chapel in the neighbourhood of Chelsea Hospital. Her Royal Highness the Duchess of Gloucester has contributed 10*l.* towards the same object.

His Grace the Duke of Northumberland has given the sum of 50*l.* in aid of the enlargement of the Berwick Charity School.

## HOPE'S VENTILATION.

TO THE EDITOR OF THE BUILDER.

SIR,—As your correspondent J. T. Hope wishes to see his warming and ventilating project (as given in the last number of your excellent Journal) become generally adopted, perhaps he will explain more fully the construction of his stove-grate, how the hot air is admitted into the flues? and in what manner the cold air, &c., are connected with the stove and hot air flues, when ventilation only is required.

Although the drawings given are sufficient to give a *general* idea of the method, they are not sufficient, in my opinion, to be of any essential service in carrying it into execution. Wishing you every success in your spirited undertaking, I remain your obedient servant,

E. S.

Exeter, April 18th, 1843.

TO THE EDITOR OF THE BUILDER.

SIR,—In your valuable Journal of last week, I find that a gentleman of the name of J. T. Hope, very liberally gives two plans and sections of a chapel and a cottage, in which he has introduced my patent warming and ventilation plan. This gentleman, like many others, is no doubt unacquainted with the principles of my patent; if he had been, or if he had seen my patent apparatus in operation, he would not have called it his invention; nor would he so liberally have offered it gratuitously to the public for general use. If Mr. Hope will take the trouble to call upon Messrs. Fry & Co., 130, Fenchurch-street, City, he will there find a fire-grate in the lower part of the warehouse, perfectly warming and ventilating the room wherein it is fixed, and also a larger one above. He will there likewise learn that formerly *three* common fire-grates and *one* of Harper's stoves were found insufficient to warm the said warehouse. To satisfy the gentleman in question of my exclusive claim to the above invention, and to prevent any litigation with parties who might unwittingly infringe my patent right, I enclose to you a pamphlet, with letters, from which you are at full liberty to extract what you may deem necessary in corroboration of my claim. With great respect I remain, Sir, yours, &c.,

April 20th, 1843. F. A. BERNHARDT.

[Mr. Bernhardt has forwarded us many testimonials of valuable import from architects and others in favour of his plans, which we may reprint at a fitting opportunity; but we may mention the names of Barry, Burton, Donaldson, Hansom, and Drs. Grant, Toulmin, &c., as having contributed them.]

TO THE EDITOR OF THE BUILDER.

SIR,—Would you have the goodness to inform me which is the best evening drawing school for a carpenter who wishes to obtain a knowledge of staircases as well as a moderate knowledge of architecture. I have attended one at a Mechanics' Institution, but find it deficient in respect to staircases. If you would have the condescension to favour a humble mechanic with the information, you will greatly oblige your humble servant,

13th April, 1843. A CONSTANT READER.

We dare not take upon ourselves to say which is the best school for the purposes inquired of by our correspondent, nor can we pretend to much information on this point. We should be glad to be able to say more, and so to benefit those who are devoted to giving instruction, as well as those seeking instruction in this way; but the only drawing master of the class referred to who has been near us is Mr. Cade, whose advertisement is in No. 3 of THE BUILDER, from which we might infer that there is a great paucity of schools of the kind inquired after. We are not surprised at the remark of a Constant Reader concerning Mechanics' Institutes. We have no objection to take to them; on the contrary, have supported them in many ways; but they are much too general in their character to be of real utility to builders. What we want are BUILDERS' INSTITUTES. Building art and science are so comprehensive, as to require not a class room of any general institution, but a hall and class rooms of its own. However, in reply to our correspondent, if he should hear of nothing more to his mind than we have already to offer to him, we will engage, as becomes us, to promote his views and those who think with him. Let only twenty young men send in their names to THE BUILDER office, as being desirous of forming a class, and we will take care very shortly after to bring forward a person of first-rate qualifications to instruct them in plans, estimates, architectural delineations, geometrical construction, &c., such as is fitting for their station; and we will also see to every other arrangement being made complete.

## LETTERS UPON ARCHITECTURE AND DUBLIN ARCHITECTS.

No. I.

TO THE EDITOR OF THE BUILDER.

SIR,—As a builder and a subscriber to your very interesting (and to our class) very valuable work, I beg leave to submit a few remarks upon what is supposed to direct us in our career of business, and the men who are supposed to direct us, namely, architects. In Dublin we have some half-dozen of "out and outers," with a city knight as their leader (who would not afford to pay the expenses of a barometer), who has made money in his hard-working days (being originally a builder's clerk) by strict attention to the arts and the ladies, bless them; this fortunate imitator of Palladio (being a faithful copier of his works) determined to make the profession respectable in Dublin by deluding the aforesaid half-dozen of out and outers to form a society of Irish architects, to extinguish and send roving about the world every unfortunate brother chip who did not join them. Their rules were as ridiculous as their society, as the sequel will tell; woe to the architect that would give plans under 2½ per cent., superintend under 5 per cent. all expenses to the country being paid, together with 3 guineas a day, allowed while travelling, for the worthies of the R.I.I.A.*; and 1 per cent. for detailed estimates, together with sundry other little details not worth *specifying*. The coterie was formed, and sundry meetings took place, and *sundry* votes of censure passed upon the government for having foreign engineers over the Board of Works, Shannon Commission, and Ordnance Departments, and *sundry* resolutions passed, seconded, and determined upon; also *sundry* little apeings at the movements of the Society of British Architects, with many other *sundry* little nonsensicalities that may be set forth in letter No. 2. This juvenile affair, alas! was nipped in the bud, the rules could not be kept up, the Irish gentry were too poor to pay such fees, and the combinators were obliged to surrender or break up; but how did they? not to their credit, I can assure you: 1st, they entertained at a public dinner their knighted president, which those *as could* attended, and *those as couldn't* did not. 30*s.* being considered better in some people's pockets than making fools of themselves; they 2ndly found out, by an arbitration left to two of the aforesaid "out and *outers*," some matters not very creditable to an architect, which were proved home to their now disrespected president, by an erasure in a specification, which was the cause of making a bankrupt of a most respectable builder, where a noble marquis was the defendant; since then nothing has been heard of the Society of Irish Architects, and to shew you their inconsistency, there is not a building of any note, when a premium is advertised for plans, but some more or less of the said defunct society does not put in for; recently a building was advertised, stating that 20 guineas would be given for the best, and 10 for the second, and would you guess how many designs were submitted? why, no less than twenty! Four out of that number were the before-mentioned "out and outers'," and one (the most aristocratic of the late defunct society) was awarded the second premium, a young man who served his apprenticeship to a provincial architect being awarded the first. So much for the members of the late Royal Institute of Irish Architects.

CAVEITO.

Dublin.

We have inserted the foregoing letter as we received it from our correspondent, but we do so on the principle of deprecating its tone, and of most effectually doing so by giving publicity to first efforts in this way. Granting that the facts are as represented, we would suggest that a work like THE BUILDER will not be most profitably occupied by such a mode of discussing them as that herein adopted. There may have been errors in the management and conduct of the Irish Society of Architects, and the individuals of that society may be vulnerable to many charges of inconsistency and unfairness, as no doubt the sister society and its members here in London are, but the principle of incorporation we hold to be good; we only quarrel with the half-working and half-carryings-out of the principle. We shall be very glad of our correspondent's favours and information, but he will permit us to advise him to avoid all personalities. Let him attack the vicious working or inconsistencies of societies, but respect the persons of its members. Let him give credit to others as well as himself for being actuated by right motives; and, above all things, let him be sure that he has done the best in his own power to be so actuated himself.

* Royal Irish Institute of Architects.

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